IBM

Wheelwriter® Series II
Printer Option
Operator’s Guide

First Edition (March 1988)

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The IBM Wheelwriter® Series II Printer Option generates and uses radio frequency energy. If the option is not installed and used in accordance with the installation instructions, operating instructions, and maintenance library, it may interfere with radio or television reception. The option has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential area.

If the option interferes with radio or television reception, which can be determined by switching the option or typewriter off and on, the user is encouraged to try one or more of the following:

- Move the receiving antenna on the radio or television.
- Relocate the typewriter in relation to the radio or television.
- Plug the typewriter into a different electrical outlet from the radio or television.

If necessary, consult your IBM Authorized Dealer. If anyone other than an IBM Authorized Dealer modifies the option or typewriter and it causes interference, the user is responsible for correcting the interference.

The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

Warning: To comply with FCC regulations on electromagnetic interference for a Class B computing device, the printer cable must be properly shielded and grounded.

To assure compliance with FCC regulations for a Class B computing device, use IBM cable Part Number 1525612. Use of substitute cable, not properly shielded and grounded, may result in violating FCC regulations.

Note: Your typewriter may have additional requirements to assure compliance with FCC regulations for Class B computing devices when the printer option is installed. Refer to the FCC Notice in your Typewriter Operator's Guide for more information.

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About Your Printer Option

Congratulations! You are about to experience using your typewriter as a letter-quality daisy wheel printer.

The printer option allows you to use your typewriter as a printer for an IBM Personal Computer or for other personal computers supporting an equivalent attachment interface.

Simply by using the typewriter keys, you can switch from a typewriter to a PC printer that provides printer control commands consistent with other IBM PC printers.

This option allows your IBM typewriter to be used in text processing (nongraphics) applications and provides software compatibility with many PC application software packages.

With the printer option, you have two machines in one – a typewriter and a printer!

Before You Begin

- If you have Spell Check installed on your typewriter, it will not be operational when the printer option is turned on. For information about Spell Check, see the Typewriter Operator's Guide.
- Follow the steps below before you turn the printer option on.
  1. Make sure the typewriter is properly set up and operational and that you are familiar with how it operates.
  2. If a paper feed option is installed on your typewriter, make sure you are already familiar with the operation of the option before you use it in printer mode. Refer to the Operator's Guide for the paper feed option.
  3. It is not recommended to use continuous forms unless the pinwheel form feeder is installed.
  4. Make sure a printwheel is installed in the typewriter. If you need help installing a printwheel, see the Typewriter Operator's Guide.
- You may find that the characters on the PC printwheel more closely match the personal computer keyboard. See "Code Page Assignments" on page 3-29 for the available printwheels. For more information on printwheels, contact your IBM Authorized Dealer. In the U.S., you may also call call IBM Direct at 1-800-IBM-2468. In Canada, call IBM Direct at 1-800-465-1234.

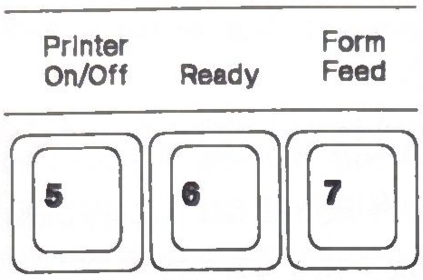
Notes:

1. The terms *ready* and *not ready* in this manual mean that the printer option is ready/not ready to receive information from the computer. In other manuals, this may be referred to as *online* and *offline*. A *ready indicator* lets you know when the printer option is ready to receive information from the computer. On some typewriter models, the indicator is a light; on others, it is a message on the display.
2. The illustrations in this manual may not exactly match the typewriter you are using because these instructions are written for more than one typewriter model.

Operating the Printer Option

Basic Printer Option Keys

The basic functions of the printer option are activated with keys located on the top row of the keyboard. The illustration below shows the keys that are used for the basic printer option functions.



Additional keys used for printer option functions are described throughout the manual. These include the paper movement keys and several coded functions such as **Code** + **B**.

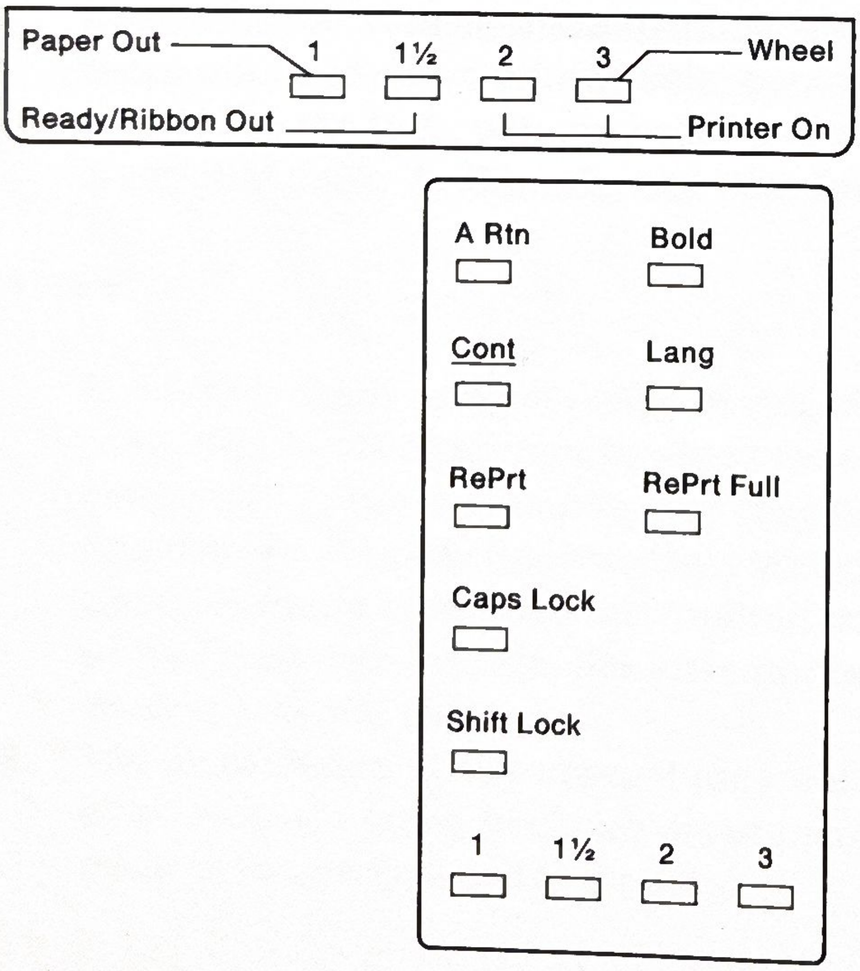
Printer Option Indicators

Lights or messages indicate the status of the printer option. On typewriters without a display, the indicators are lights on an indicator panel. On typewriters with a display, the indicators are messages on the display.

Note: The Ribbon-Out indicator operates only if there is a sensor installed on your typewriter. The sensor is installed if a paper handling option has ever been installed on the typewriter.

Typewriters with an Indicator Panel

On typewriters with an indicator panel, the **Line Space** lights indicate the status of basic printer option functions. A label on the typewriter designates the printer option functions of the **Line Space** lights. The illustration below shows the **Line Space** lights on the typewriter indicator panel and the label that describes the printer option functions of the lights.


Paper Out
1
1½
2
3
Wheel
Ready/Ribbon Out
Printer On
A Rtn
Bold
Cont
Lang
RePrt
RePrt Full
Caps Lock
Shift Lock
1
1½
2
3

Following is a description of each light and its function as a printer option indicator:

Paper Out (Line Space 1 Light)

This light is off during normal printer option operation. It blinks when paper is needed by the printer option.

Ready/Ribbon Out (Line Space 1½ Light)

This light has two functions: It is on when the printer option is in the *ready* mode or off when the option is in the *not ready* mode. The light blinks when the end of ribbon has been reached.

Printer On (Line Space 2 Light)

This light is always on when the printer option is on.

Printer On/Wheel (Line Space 3 Light)

This light has two functions. It is on when the printer option is on. It blinks when a "change printwheel" command is received by the printer option or when a printwheel is incorrectly installed or missing.

The chart below summarizes how the **Line Space** lights are used to indicate printer option functions.

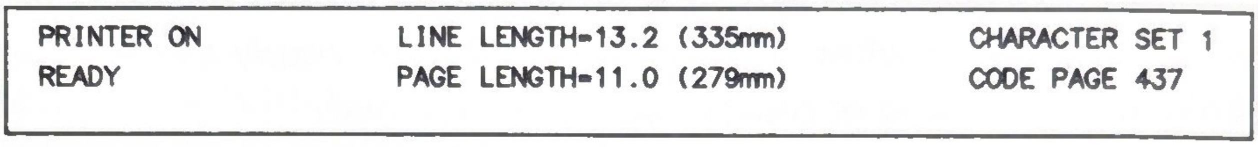
Condition	**1 (Paper Out)**	**1½ (Ready/ Ribbon Out)**	**2 (Printer On)**	**3 (Printer On/ Wheel)**
Printer On (Ready)	Off	On	On	On
Printer On (Not Ready)	Off	Off	On	On
Out of Paper	Blinking	Off	On	On
End of Ribbon	Off	Blinking	On	On
Change Printwheel	Off	Off	On	Blinking

Note: When indicators come on which require operator attention, for example, the change printwheel indicator, the typewriter beeps three times.

Additional indicator lights are also used for printer option functions. These lights are explained later in the manual with the appropriate function.

Typewriters with a Display

On typewriters with a display, messages are displayed to indicate printer option functions. The illustration below shows an example of the messages displayed when the printer option is on and in the *ready* mode.



```
PRINTER ON          LINE LENGTH=13.2 (335mm)          CHARACTER SET 1
READY               PAGE LENGTH=11.0 (279mm)          CODE PAGE 437
```

The following messages indicate printer option functions:

- PRINTER ON is displayed when the printer option is turned on.

- READY is displayed when the printer option is on and in the *ready* mode.

- NOT READY is displayed when the printer option is on and in the *not ready* mode.

The following messages require operator attention. The messages blink and the typewriter beeps three times when the condition occurs.

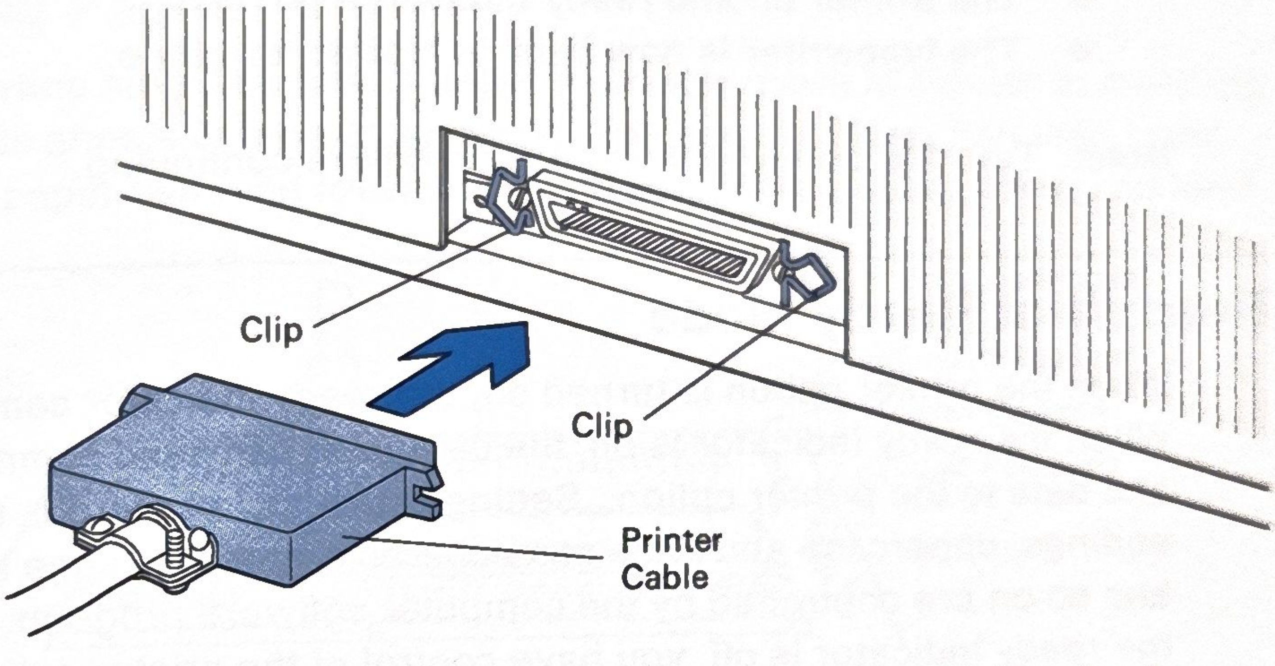
- CHANGE WHEEL is displayed when the printwheel is missing or incorrectly installed or when a "change printwheel" command is sent from the computer.
- END OF RIBBON is displayed when the end of ribbon has been reached. The READY message is also blinking.
- OUT OF PAPER is displayed when paper is needed by the printer option.

Additional messages, such as PAGE LENGTH = 11.0 (279 mm), are also displayed. These messages are explained later in the manual with the appropriate function.

Attaching the Printer Cable

Note: The cable is not provided with the printer option.

1. Turn off the typewriter and the computer.
2. Attach the printer cable from your computer to the large socket on the back of the typewriter. Use the shape of the plug to help attach the cable properly.



3. Push the clips into the notches on the plug to hold the plug in place.
4. If the cable has a grounding wire, disregard it.
5. Follow your computer instructions to attach the cable to your computer.

Turning the Printer Option On and Off

1. Turn on the typewriter and the computer.
2. Hold down **Code** while you press **5** to turn the printer option on.
    - The typewriter is now in printer mode and cannot be used as a typewriter.
    - The *printer on* and *ready* indicators come on.
3. To turn the printer option off, hold down **Code** while you press **5**.
    - The *printer on* and *ready* indicators go off.
    - The typewriter is now back in typewriter mode.

Note: Turn the printer option back on before continuing.

Ready/Not Ready Mode

When the printer option is turned on, the *ready* indicator comes on. When the *ready* indicator is on, the computer can send commands and data to the printer option. Settings such as left margin, line endings, uppercase and lowercase characters, vertical line spacing, and so on are controlled by the computer software program. When the *ready* indicator is off, you have control of the printer option.

To put the printer option in *not ready* mode, press the **6** key.

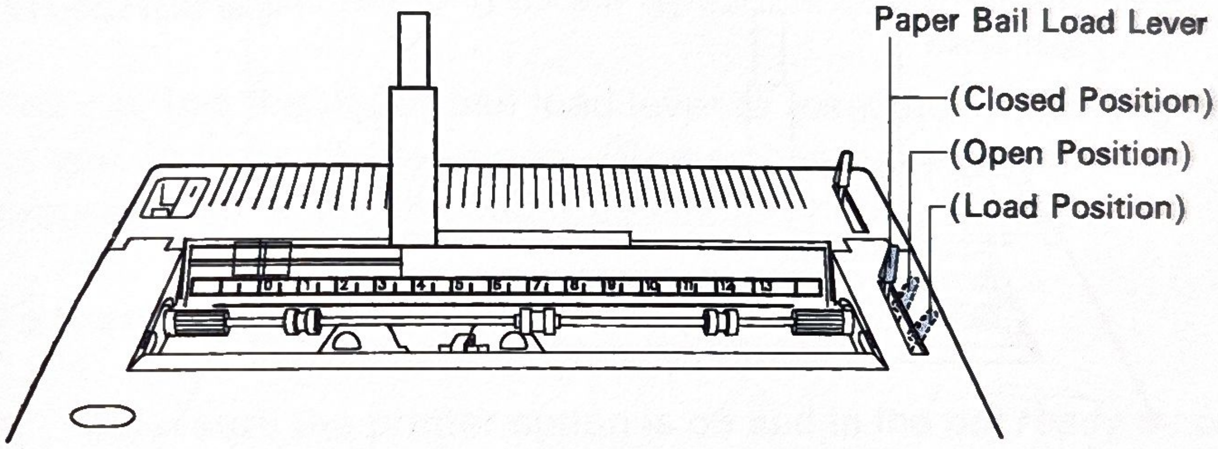
- The *ready* indicator goes off and the printwheel spins.
- The carrier moves away from the left margin so the printwheel can be easily changed.
- The printer option cannot accept commands from the computer.
- The typewriter keyboard cannot be used for normal typewriter functions. However, you can perform such functions as inserting paper, moving paper and selecting Bold Print.
- If you send any computer commands to the printer option that change settings, such as form length or tabs, the option will save those settings while in the *not ready* mode. However, those settings will not be saved when you turn the printer option off.

To put the printer option in *ready* mode, press **6**.

- The *ready* indicator comes on and the printwheel spins.
- The typewriter keyboard can only be used for basic printer option functions.
- The printer option can accept commands and data from the computer.

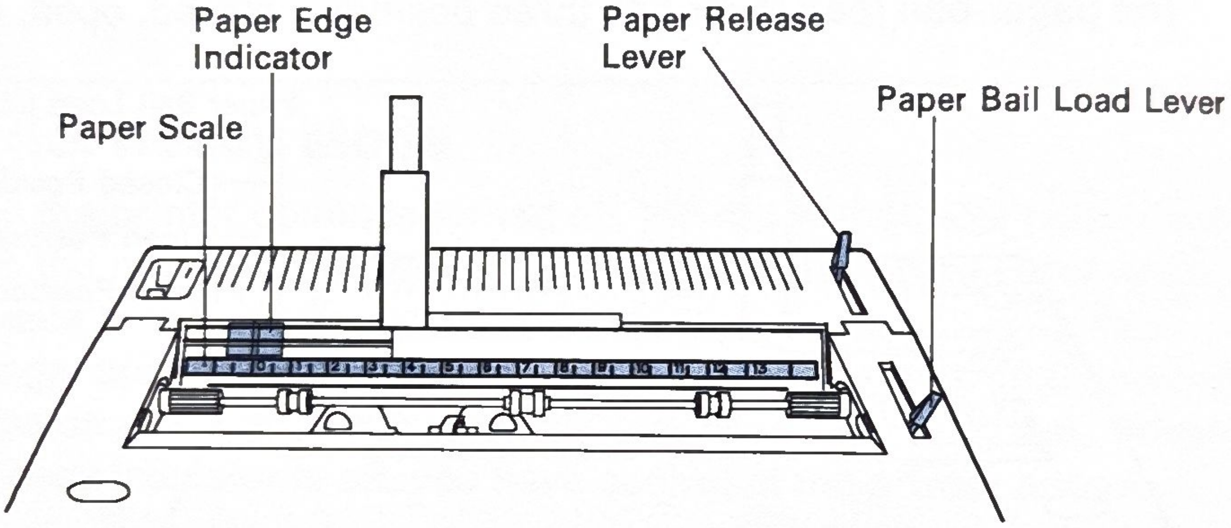
Inserting Paper

Inserting single sheets of paper in printer mode is similar to inserting single sheets in typewriter mode. You use the paper bail load lever. The paper bail load lever has three positions: closed, open, and load.


Paper Bail Load Lever
(Closed Position)
(Open Position)
(Load Position)

To insert single sheets of paper, follow the directions below. If you have a paper feed option installed, refer to the Operator's Guide for the option to insert paper.

1. Make sure the computer is turned on.
2. Make sure the printer option is turned on.
3. Push the paper release lever all the way to the back of the typewriter.
4. Align the center of the paper edge indicator with the vertical line to the left of zero (0) on the paper scale.
5. Align the left edge of the paper with the vertical line in the center of the paper edge indicator.



6. Pull the paper bail load lever all the way forward to the load position. When the paper begins to feed, let go of the paper bail load lever. The paper feeds to the first available writing line at the top of the page.
7. After printing starts and the paper has cleared the paper bail, push the paper bail load lever all the way back until the paper bail holds the paper against the platen. Do not move the paper bail back against the platen until the paper has cleared the paper bail. If you move the paper bail back too soon, the paper will crumple against the paper bail while the first few lines are printing.

Resetting the First Writing Line

You can reset the first writing line in printer mode on typewriters that support this function in typewriter mode. To determine if your typewriter supports this function, refer to your Typewriter Operator's Guide.

In typewriter mode, the paper feeds to approximately one inch (25 mm) from the top of the page. This setting is not carried over to printer mode. In printer mode, the paper feeds to the first writing line at the top of the page. You may want to reset the first writing line to start printing below the top of the page. The first writing line settings in both printer mode and typewriter mode are saved when you turn the typewriter off (as long as the typewriter batteries are good).

You can use the paper bail load lever to reset the first writing line just as you do in typewriter mode. (Remember that your software program may move the paper up before printing starts.)

To reset the first writing line:

1. Make sure the printer option is on and in the *not ready* mode.
2. Insert paper, using the steps under "Inserting Paper" on page 2-7.
3. Use the paper movement keys to position the paper to the point where you want to set the new first writing line.
4. Hold down **Code** while you pull the paper bail load lever forward to the load position. The printwheel spins when the new first writing line is set.

   Note: If you have a pinwheel form feeder installed, a new top of form is set.

5. Push the paper bail load lever back to the closed position and release the **Code** key.

Additional Printer Option Keys

Paper Movement Keys

The paper movement keys work the same way in printer mode as they do in typewriter mode. These are active only in the *not ready* mode.

Form Feed (7) Key

The **Form Feed** key is used in printer mode to feed paper into and out of the typewriter.

- In single sheet mode, press **Form Feed** to feed paper out of the typewriter.
- With pinwheel forms installed, press **Form Feed** to feed the paper to the top of the next form.

Code + B (Select Bold Print)

You can select Bold Print in printer mode so that printing will be much darker than normal print. To select Bold Print:

1. Make sure the printer option is on and in the *not ready* mode.
2. Hold down **Code** while you press **B** (**Bold**) to turn Bold Print on.
   - The printwheel spins.
   - The **Bold** light comes on or the BOLD message is displayed.
3. Hold down **Code** while you press **B** (**Bold**) to turn Bold Print off.

Notes:

1. Bold Print is always off when the printer option is turned on.
2. The selection of Bold Print in typewriter mode is not carried over to printer mode. If the Bold function was turned off in typewriter mode, it will be off when you go from printer mode back to typewriter mode.
3. Selecting Bold Print with **Code** + **B** overrides the following printer commands: ESC E, ESC F, ESC G, and ESC H.
4. When Bold Print is selected, lines of text are printed left to right instead of bidirectionally.

Interrupting Printing

You can interrupt printing and put the printer option in the *not ready* mode. To interrupt printing, press the **6** key.

- The typewriter stops printing when it reaches the end of the line.
- The *ready* indicator goes off. The printer option cannot receive information from the computer while the *ready* indicator is off.

To resume printing, press the **6** key.

- The *ready* indicator comes on.
- Printing will resume where it was interrupted.

Note: If the printer option is in the *not ready* mode for more than a few moments, the computer may *time out*. The amount of time it takes to time out varies for different computers and software packages. If the computer does time out (does not resume sending data to the printer after the *ready* indicator comes back on), you must continue the job or restart the job from the computer.

Printer Buffer

The printer option has a temporary storage area called a buffer which holds at least 2000 bytes of data. Information sent from the computer is stored in the buffer until it is printed. This information is saved during the *not ready* mode and will be printed when the option is returned to *ready* mode. However, information is not saved when the printer option is turned off.

Clearing the Buffer

If you have interrupted a job that was printing and do not want to complete it, you need to clear it from the printer buffer before starting a new job.

1. Cancel the job from the computer.
2. Turn the printer option off and back on. (Hold down **Code** while you press **5** twice.)

- This will clear the buffer and reset the default conditions, and the printer option will be ready to receive a new job.

Operating Notes

Page Length Settings (Model 6783 only)

If you have a paper feed option attached you may want to specify a particular page length setting. Page length settings can only be changed in printer mode. You can select page length settings of 11 inches (279 mm), 11.69 inches (297 mm), 12 inches (305 mm), or 14 inches (356 mm) in printer mode by using **Code** + **Shift** + **Z**. See "Page Length (Form Length)" on page 3-2.

For example, if a page length setting of 14 inches (356 mm) is desired when using a paper feed option in the typewriter mode, the page length must be set in the printer mode.

Typewriter Settings

Typewriter settings that were selected during typewriter mode will be saved when the printer option is turned on. The settings will not be active during printer mode but will again be active when you return to typewriter mode. For example, if you select double spacing (line space 2) in typewriter mode, double spacing will be selected when you go from printer mode back to typewriter mode. However, the following two selections made in typewriter mode remain active in printer mode:

Language Selection

If your typewriter supports alternate languages and you select an alternate language in typewriter mode, that language will be active when you go to printer mode. Remember that the keyboard ID number must correspond to the printwheel. You need to return to typewriter mode to select another language or return to the default language.

Note: On typewriters with a display, the keyboard ID you select is displayed. For example, if you select alternate keyboard 041, KYBD 041 will be displayed. On typewriters without a display, the **Lang** light is on.

Impression Control

The impression control setting that was selected in typewriter mode is saved when you go to printer mode. The impression control indicator is given in typewriter mode while holding down **Code** + **Q**. The setting can only be changed by going back to typewriter mode or by sending the Set Impression Level (SIL) command from the computer. The impression setting selected by the SIL command is not saved when the printer option is turned off and you return to typewriter mode.

Reference

Default Settings

The printer option has five default settings. (Typewriter models that do not support alternate languages have four default settings.) Default settings are active when the printer option is turned on and can be changed during printer mode. In some printers, these settings are controlled with setup switches.

You can change the default settings when the printer option is in the *not ready* mode. For example, one setting allows you to choose a page length other than 11 inches (279 mm). The settings are maintained when the typewriter is turned off as long as the typewriter batteries are good.

To change the default settings, hold down **Code** and **Shift** while you press a character key. The keys must be pressed in the sequence given. An indicator shows the status of the default settings.

Notes:

1. The settings you select will remain in effect until you change them.
2. Computer commands sent to the printer from the software program will override the default settings. The indicators will show the settings you selected, but not those specified by commands sent from the personal computer.

A description of the five default settings and how to change them are as follows:

Page Length (Form Length)

There are four different page lengths from which to choose. To select a different page length, hold down **Code** and **Shift** while you press and release **Z**. Each time you press and release **Z**, the next page length is selected.

On typewriters with indicator panels, **RePrt** and **RePrt Full** show the page length selected:

1. Both **RePrt** and **RePrt Full** are off when 11 inches (279 mm) is selected.
2. Only the **RePrt Full** light is on when 11.69 inches (297 mm) is selected.
3. Only the **RePrt** light is on when 12 inches (305 mm) is selected.
4. Both **RePrt** and **RePrt Full** are on when 14 inches (356 mm) is selected.

On a typewriter with a display, a message such as PAGE LENGTH=11.0 (279 mm) is displayed.

Line Length (Page Width)

The initial default setting is a line length of 13.2 inches (335 mm). The **Caps Lock** light is off or the LINE LENGTH=13.2 (335 mm) message is displayed. To change the default to 8 inches (203 mm), hold down **Code** and **Shift** while you press **X**. The **Caps Lock** light comes on or the LINE LENGTH= 8.0 (203 mm) message is displayed.

To return to a line length of 13.2 inches (335 mm), hold down **Code** and **Shift** while you press **X**.

Character Set

This setting allows you to print characters from character set 1 or character set 2. If character set 1 is selected, the Cont light is off or the CHARACTER SET 1 message is displayed.

To print from character set 2, hold down **Code** and **Shift** while you press **S**. The Cont light comes on or the CHARACTER SET 2 message is displayed.

To return to character set 1, hold down **Code** and **Shift** while you press **S**.

Note: See "Character Sets 1 and 2" on page 3-42 for an explanation of character set 1 and set 2.

Alternate Code Page

Each keyboard ID is assigned a primary and alternate code page. However, typewriters that do not support an alternate language support only code page 437. Some characters in the code pages differ. For an explanation of code pages, see "Explanation of Code Pages" on page 3-31. For a listing of code pages by keyboard name and ID, see "Code Page Assignments" on page 3-29.

The initial default setting is the primary code page. To select the alternate code page, hold down **Code** and **Shift** while you press **W**. The **Shift Lock** light comes on or a message such as CODE PAGE 437 is displayed. To return to the primary code page, hold down **Code** and **Shift** while you press **W**.

Auto Line Feed after Carrier Return

When this setting is on, an additional line feed command is inserted after every carrier return command from the computer. The line feed command advances the paper up one line space based on the currently active line-spacing increment.

The initial default setting is "no auto line feed after the carrier return." To add the line feed, hold down **Code** and **Shift** while you press **A**. The **ARtn** light comes on or the AUTO LINEFEED message is displayed. To turn Auto Line Feed off, hold down **Code** and **Shift** while you press **A**.

Below is a chart showing the default settings, how to change them, and the indicators for each setting:

Function	**Code + Shift +**	**Settings**	**Indicator Panel**	**Display Messages**
Page Length	Z	11 in. (279 mm)	**RePrt** & **RePrt Full** Off	PAGE LENGTH=11.0 (279 mm)
		11.69 in. (297 mm)	**RePrt Full** On and **RePrt** Off	PAGE LENGTH=11.69 (297 mm)
		12 in. (305 mm)	**RePrt** On and **RePrt Full** Off	PAGE LENGTH=12.0 (305 mm)
		14 in. (356 mm)	**RePrt** & **RePrt Full** On	PAGE LENGTH=14.0 (356 mm)
Line Length	X	13.2 in. (335 mm)	**Caps Lock** Off	LINE LENGTH=13.2 (335 mm)
		8 in. (203 mm)	**Caps Lock** On	LINE LENGTH=8.0 (203 mm)
Character Set	S	Character Set 1	**Cont** Off	CHARACTER SET 1
		Character Set 2	**Cont** On	CHARACTER SET 2
Code Page **	W	Primary Code Page	**Shift Lock** Off	Code Page 437*
		Alternate Code Page	**Shift Lock** On	Code Page 850*
Auto Line Feed	A	No Line Feed after CR	**ARtn** Off	None
		Line Feed after CR	**ARtn** On	AUTO LINEFEED

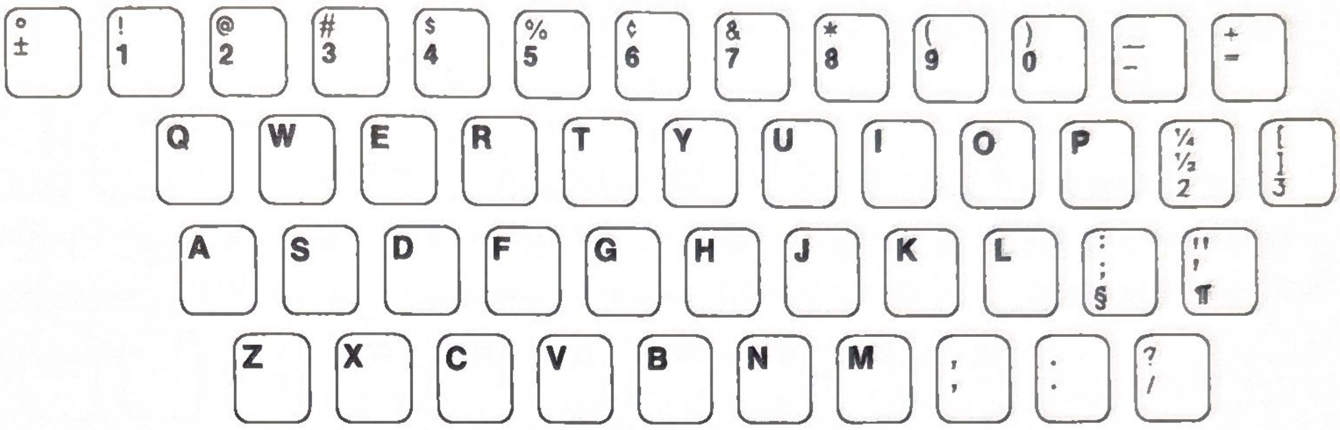
*or appropriate code page number for the selected keyboard ID

**Typewriters that do not support alternate languages will support *only* code page 437.

The keyboard you have may differ from the U. S. keyboard (ID 1) shown in this manual. Due to the differences, you may need to substitute other keys to perform coded functions (**Code** + another key).

The keys that are substituted are located in the same position on the keyboard as the U. S. keys.

United States — Keyboard ID 1

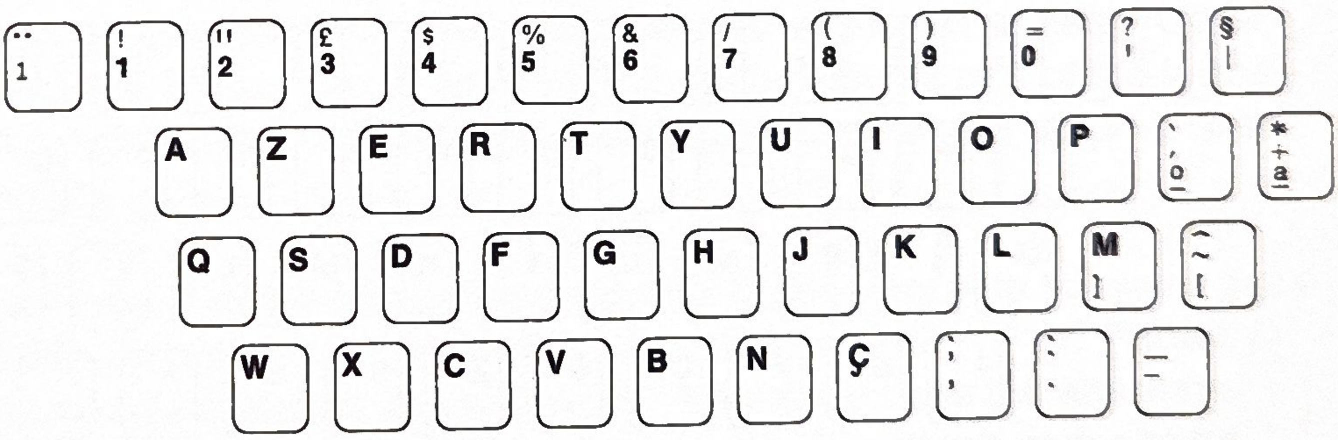


° ±
! 1
@ 2
# 3
$ 4
% 5
¢ 6
& 7
* 8
(9
) 0
_ -
+ =
Q W E R T Y U I O P
¼ ½ 2
[ ] 3
A S D F G H J K L
: ; §
" ' ¶
Z X C V B N M
, ,
. .
? /

Compare the following keyboards to the U. S. keyboard. Use the table that follows each keyboard to identify the coded function used for setting defaults. The country and the keyboard are identified with the keys used to perform the coded function. Also included are the keys used to set the impression control.

If you are using the Portugal keyboard (ID 63), the keys used are:

Portugal — Keyboard ID 63



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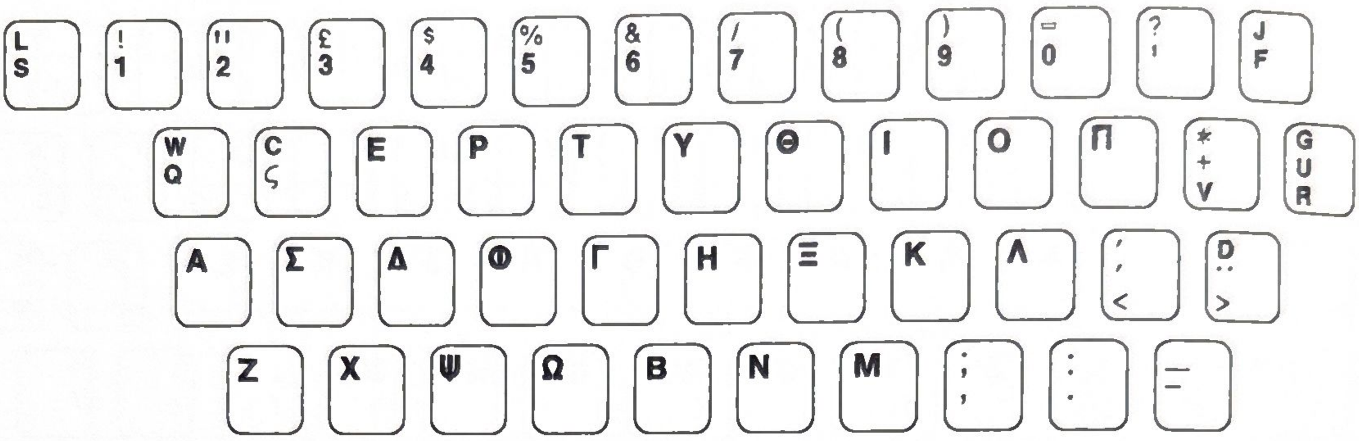
! 1
" 2
£ 3
$ 4
% 5
& 6
/ 7
(8
) 9
= 0
? '
§ |
A Z E R T Y U I O P
` ´ º
* + ª
Q S D F G H J K L M
^ ~ [
W X C V B N Ç
; ,
: .
_ -

U. S. ID 1 Keys used	Portugal ID 63 Substitute keys used	Function
Code + A	**Code + Q**	Auto Line Feed after Carrier Return
Code + W	**Code + Z**	Alternate Code Page
Code + Z	**Code + W**	Page Length Settings
Code + Q	**Code + A**	Impression Control

If you are using the Greece (Greek) keyboard ID 219, the keys used are:

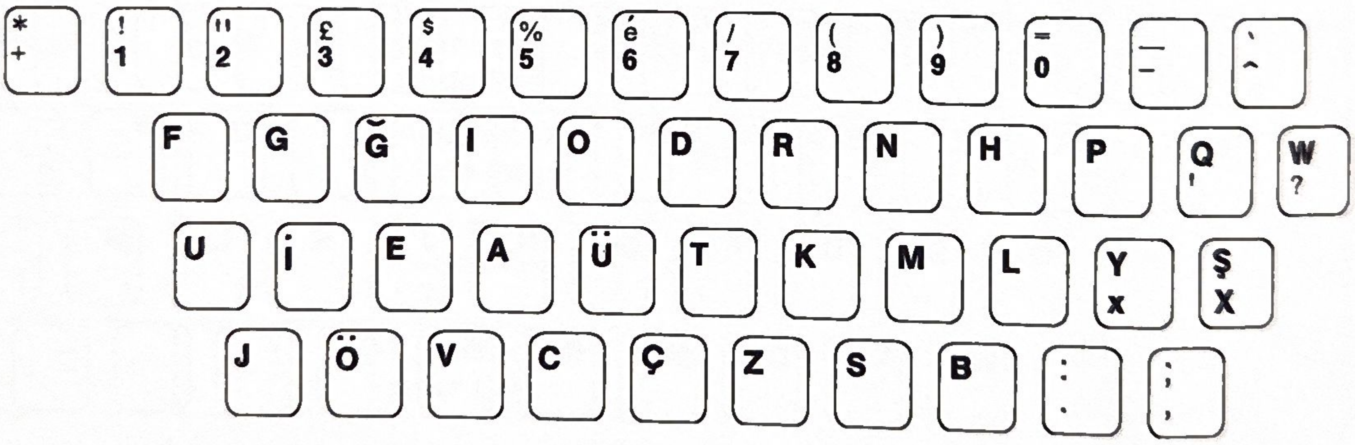
Greece (Greek) — Keyboard ID 219


L S ! 1 " 2 £ 3 $ 4 % 5 & 6 / 7 (8) 9 = 0 ? ' J F
W Q C ς E P T Y Θ I O Π * + V G U R
A Σ Δ Φ Γ H Ξ K Λ ' , < D .. >
Z X Ψ Ω B N M ; , : . — –

U. S. ID 1 Keys used	Greece-Greek ID 219 Substitute keys used	Function
Code + W	Code + Ç	Alternate Code Page
Code + S	Code + Σ	Character Set

If you are using the Turkey keyboard (ID 79), the keys used are:

Turkey — Keyboard ID 79


* + ! 1 " 2 £ 3 $ 4 % 5 é 6 / 7 (8) 9 = 0 — - ` ^
F G Ğ I O D R N H P Q ' W ?
U İ E A Ü T K M L Y x Ş X
J Ö V C Ç Z S B : . ; ,

U. S. ID 1 Keys used	Turkey ID 79 Substitute keys used	Function
Code + W	Code + G	Alternate Code Page
Code +A	Code + U	Auto Line Feed after Carrier Return
Code + S	Code + İ	Character Set
Code +Z	Code +J	Page Length Settings
Code + X	Code + Ö	Line Length
Code + Q	Code + F	Impression Control

Software Support

All software packages do not automatically support all the features of your printer option. For example, automatic text underlining is not a feature of all word processing software.

In addition, some software packages may be able to perform a task on one printer and not on another. For instance, a word processing program may support proportional spacing for one printer and not for another.

For details on which printer capabilities your software supports, review the instruction manual that came with your software, or contact your software point of purchase.

When your software package does not support one of the printer option's capabilities, such as emphasized (Bold) print, you may be able to use printer control codes to perform the function.

Since each software application is unique, read your software instructions carefully before using the printer commands. Some software allows you to embed control codes within text or data. Other software allows you to pass control codes only as part of the formatting lines, while some software packages prohibit the passing of any control codes to the printer.

Methods of embedding printer control codes vary with software packages. For example, IBM Writing Assistant uses the *P or *Printer command to embed control codes. Multiplan[1] uses the alternate button (Alt) for embedding the codes and also allows codes to be passed in the printer formatting lines. Most software packages have instructions for the use of printer control codes in their operating manual.

Once you are familiar with your software program, you can use the printer commands section in this manual to perform functions that your software program does not support. See "Printer Commands (Control Codes and Escape Sequences)" on page 3-9.

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[1] U.S. trademark of Microsoft Corporation

Justifying Text with a Proportional Spacing Printwheel

The commands Space Forward (ESC d) and Space Backward (ESC e) can be used to justify text with a proportional spacing printwheel. These commands move the carrier in very fine horizontal increments of 1/120 inch.

The width of each proportional spacing character can be found in the code page tables starting on page 3-34. Each unit is 1/120 inch.

Printer Commands (Control Codes and Escape Sequences)

You can send additional commands from your computer to your printer option to control printer operations. Some of these commands are single codes and are called printer control codes. Others combine several codes or characters and are called escape sequences. Below is an example of how they are used with IBM Personal Computer Basic.

Example – for the Basic programmer

ASCII number 12 performs a form feed command.

- What to program: **LPRINT CHR$(12);**
- What will happen: The paper will advance to the top of the next form.

This section describes the control codes, followed by the escape sequences. The first line of each command contains the command abbreviation and a descriptive title. If the command is an escape sequence which requires parameters, the next line will identify the sequence of characters and parameters which are required for a complete command. Following this line is a discussion of the command, how it functions, and the purpose or meaning of each parameter. Each command ends with an example of an IBM Personal Computer BASIC program statement which shows you how to use the command.

Note: When the printer option is initialized, it is returned to its default settings. The default settings may be altered by holding down **Code** and **Shift** while you press a character key. See "Default Settings" on page 3-1. The printer option is initialized when it is reset or when the printer initialization interface signal (INIT) in the parallel interface is activated by the host computer. To reset the printer, hold down **Code** while you press **5** twice.

Control Codes

NUL **Null**

Used with ESC B and ESC D as a list terminator.

```
LPRINT CHR$(0);
```

BEL **Bell**

Sounds the typewriter beeper.

```
LPRINT CHR$(7);
```

BS **Backspace**

Backspaces the carrier one character width.

```
LPRINT CHR$(8);
```

HT **Horizontal Tab**

Moves the carrier to the next horizontal tab stop. Tabs are set with ESC D. This command is ignored if there is no tab set to the right of the carrier location. (Setting tabs while using the printer option does not affect the tabs set on the typewriter.)

```
LPRINT CHR$(9);
```

LF **Line Feed**

Spaces the paper up one line based on the currently active line-spacing increment.

```
LPRINT CHR$(10);
```

VT **Vertical Tab**

Moves the paper up to the next vertical tab stop. The horizontal position is not affected. If there are no tab stops beyond the current position, and within the active page boundary the VT is treated as a line feed. Vertical tabs are set using the ESC B command.

```
LPRINT CHR$(11);
```

FF Form Feed

Advances the paper to the top of the next form and the carrier moves to the left margin.

```
LPRINT CHR$(12);
```

CR Carrier Return

Causes the data that follows a carrier return to print at the left margin. No line feed occurs unless the default setting for auto line feed is on, or the computer sends an ESC 5 command to the printer.

Note: IBM Personal Computer BASIC adds a line feed to CHR$(13). See the BASIC "Open Statement" for additional information.

```
LPRINT CHR$(13);
```

SO Begin Double-Wide Printing by Line

Selects double-wide print mode in which all graphics and spaces are printed with double the horizontal motion index (HMI) setting. This will preserve the correct horizontal spacing for applications which use the double width print mode. This command is canceled by the commands: DC4, LF, VT, CR, FF, ESC W, ESC], or by a line wrap.

```
LPRINT CHR$(14);
```

SI Begin Condensed Printing

Sets pitch to 17.1 characters per inch (cpi).

Note: A 15-pitch printwheel is recommended with this mode.

```
LPRINT CHR$(15);
```

DC2 Set Pitch = 10

Sets pitch to 10 cpi. If double-wide print mode is active, this command does not cancel double-wide print, but modifies it to 5 cpi.

```
LPRINT CHR$(18);
```

DC4 **End Double-Wide Print by Line**

Turns off double-wide print by line.

```
LPRINT CHR$(20);
```

ESC **Escape**

Lets the printer option know that the next data sent is a printer command.

```
LPRINT CHR$(27);
```

SP **Space**

A nonprinting, graphic character that causes the carrier to move to the right one character width.

```
LPRINT CHR$(32);
```

RSP **Required Space**

Same as SP (Space).

```
LPRINT CHR$(255);
```

Escape Sequences

ESC- **Begin/End Underline**

ESC - *n*

ESC - (minus) followed by a parameter value of *n* = 1 (any ODD value) causes the printer to begin automatically underlining all subsequent characters, spaces, and space generated by the ESC d (Space Forward) command. Space generated by a horizontal tab is not underlined. A value of *n* = 0 (EVEN Value) ends underline mode.

```
LPRINT CHR$(27);CHR$(45);CHR$(n);
```

ESC 0 **Set Line Space to 1/8 inch**

Causes line spacing to be set to 8 lines per inch.

```
LPRINT CHR$(27);CHR$(48);
```

ESC 1 Set Line Space to 7/72 inch

Causes line spacing to be set to 7/72 inch per line.

```
LPRINT CHR$(27);CHR$(49);
```

ESC 2 Start Variable Line Space

Causes the line spacing to be set to the value specified by the last ESC A command. If no ESC A command has been given, line spacing is set to 1/6 inch. The next line movement command will cause the new line spacing to start.

```
LPRINT CHR$(27);CHR$(50);
```

ESC 3 Set Graphics Line Space

ESC 3 *n*

ESC 3 sets line spacing to *n*/216 inch. Valid values of *n* are 1 through 255. For example, to set line spacing to 9/216 inch:

```
LPRINT CHR$(27);CHR$(51);CHR$(9);
```

ESC 4 Set Top of Form

This command sets the current line position as top of form.

```
LPRINT CHR$(27);CHR$(52);
```

ESC 5 Auto Line Feed On/Off

ESC 5 *n*

Provides on/off control of the auto line feed mode. When the auto line feed mode is active, the printer performs a line feed function after each CR encountered in the data stream.

n=odd (1 to 255) turns on auto LF mode.
n=even (0 to 254) turns off auto LF mode
(default condition)

The initial state of this mode is determined by the default setting for Auto Line Feed after carriage return. See "Auto Line Feed after Carrier Return" on page 3-3.

```
LPRINT CHR$(27);CHR$(53);CHR$(n);
```

ESC 6 Select Character Set 2

See "Character Sets 1 and 2" on page 3-42 for a description of PC Character Set 2.

```
LPRINT CHR$(27);CHR$(54);
```

ESC 7 Select Character Set 1

See "Character Sets 1 and 2" on page 3-42 for a description of PC Character Set 1.

```
LPRINT CHR$(27);CHR$(55);
```

ESC 8 Ignore End of Form

This command allows the printer to continue to print without stopping at the end of form or page.

```
LPRINT CHR$(27);CHR$(56);
```

ESC 9 **Honor End of Form**

This command causes the printer to honor the out-of-paper condition.

```
LPRINT CHR$(27);CHR$(57);
```

ESC : **Set Pitch to 12**

Sets the pitch to 12 characters per inch. If double-wide mode is active, this command does not cancel double-wide print, but sets pitch to six characters per inch.

```
LPRINT CHR$(27);CHR$(58);
```

ESC > **Set Horizontal Motion Index (HMI)**

ESC > *n*

Sets the Horizontal Motion Index. The HMI is the width of the graphic characters, spaces, backspaces, and horizontal tab stop columns (that is, the absolute distance between the centerlines of subsequent characters). The value of parameter *n* specifies in multiples of 1/120 of an inch, the horizontal motion index.

```
LPRINT CHR$(27);CHR$(62);CHR$(n);
```

ESC A Set Text Line Spacing

ESC A *n*

Escape A stores a line-spacing value which is activated by the ESC 2 (Activate Variable Line Spacing) command.

The value stored is **n** units per inch, where the units per inch are set by ESC [\ (Set Vertical Units). When the printer is turned on, the value is set to 12/72-inch. The valid range for **n** is 1 to 255. For example, to change line spacing to 3 lines per inch, the first LPRINT stores a value of 24/72, assuming that units per inch equals 72. The second LPRINT activates the stored value.

```
LPRINT CHR$(27);CHR$(65);CHR$(24);
LPRINT CHR$(27);CHR$(50);
```

ESC B Set Vertical Tabs

ESC B *n*1 *n*2 ... *n*k 0

The *n*'s in the format above are used to indicate tab stop positions which are referenced in print lines from the top of the form which is line one. Values of *n* between 1 and 255 are valid. Tab stop numbers which are not in ascending numerical order are discarded. The first 16 valid tab stops are stored. Additional tab stops are discarded. A zero value terminates the tab sequence. ESC B followed only by zero or ESC R (Set Default Tab Rack) may be used to clear vertical tab stops. Vertical tab stops are also cleared when the printer is initialized. For example, to set tabs at 10, 20, and 40:

```
LPRINT CHR$ (27); CHR$ (66); CHR$ (10);
       CHR$ (20); CHR$ (40); CHR$ (0);
```

ESC C Set Form Length

ESC C *n*, *m*

Specifies the length of the page in either lines (in the current line density) or inches, resets skip perforation mode, and establishes top of form.

The value *n* specifies the page length in lines. The printer converts this value to inches so that if the line spacing is changed, the page length is still correct. If the value *n* is zero, then the value *m* specifies the form length. For example, to set the page length to 55 lines:

```
LPRINT CHR$(27);CHR$(67);CHR$(55);
```

The value *m* specifies the page length in inches. If the value of *n* is greater than zero, this parameter must not be present. If both parameters are zero, this command is ignored. For example, to set the page length to 10 inches:

```
LPRINT CHR$(27);CHR$(67);CHR$(0);
       CHR$(10);
```

When the printer option is initialized, the default page length is based on the page length default settings. See "Default Settings" on page 3-1.

Note: The maximum page length which may be specified is 43 inches. Lengths greater than 43 inches will result in a page length of 43 inches.

ESC D Escape D (Set Horizontal Tab Stops)

ESC D *n*1 *n*2 ...*n*k 0

The *n*'s in the above format indicate the tab stops in print columns which are referenced from column one. The first 28 values of *n* between 1 and 255 are stored. Additional tab stops are discarded. Tab stop values which are not in ascending numerical order are discarded. The zero value terminates the tab stop sequence. ESC D followed by zero will clear all tab stops. Tabs are set in every eight columns beginning with column 9 when the printer is initialized or an ESC R command is processed. For example, to set horizontal tab stops in printer column positions 10, 20, and 40:

```
LPRINT CHR$ (27); CHR$ (68); CHR$ (10);
       CHR$ (20); CHR$ (40); CHR$ (0);
```

ESC E Begin Emphasize Print (Bold Print)

Activates the emphasize print mode. Once activated, this mode stays active until it is terminated by an ESC F command or the printer option is initialized. The emphasize print mode is performed by overstriking a graphic character after a small horizontal movement. While the emphasize print mode is active, the double-strike print mode, if selected, is suspended. When this mode is selected, lines of text are printed left to right instead of bidirectionally.

```
LPRINT CHR$(27);CHR$(69);
```

ESC F End Emphasize Print (Bold Print)

This command deactivates the emphasize print mode which is activated by the ESC E command.

```
LPRINT CHR$(27);CHR$(70);
```

ESC G **Begin Double-Strike Print**

Activates the double-strike print mode. Once activated, this mode stays active until it is terminated by an ESC H command or the printer option is initialized. The double-strike print mode is performed by overstriking a graphic character. While the emphasize print mode is active, the double-strike print mode is suspended.

```
LPRINT CHR$(27);CHR$(71);
```

ESC H **End Double-Strike Print**

This command deactivates the double-strike print mode which is activated by the ESC G command.

```
LPRINT CHR$(27);CHR$(72);
```

ESC I **Change Printwheel**

ESC I *n*

Places the printer option *not ready*; the beeper sounds three times, and the change printwheel indicator comes on to indicate that a printwheel change is requested. After inserting the new printwheel, press **6** to resume printing. The option will set the pitch according to the installed printwheel. The value *n* must be present but is not used for command implementation.

```
LPRINT CHR$(27);CHR$(73);CHR$(n);
```

ESC J Relative Move Base Line

ESC J *n*

The ESC J command advances the paper *n*/216 inches. (*n* specifies the vertical move distance.) The valid range for *n* is 1 to 255. The paper advance is unaffected by skip perforation. For cut sheet paper, the page is ejected when the top edge of the next line exceeds the page length. When the next line is ready to be printed, the next page is loaded or requested and the line is printed at the top edge of the page.

For example, to advance the paper 1/2 inch:

```
LPRINT CHR$(27);CHR$(74);CHR$(108);
```

ESC N Set Skip-Over Perforation

ESC N *n*

Specifies the number of lines to be skipped at the bottom of each page. Once this function is activated, it stays active until the ESC O command is encountered, the printer option is initialized, or the set page length (ESC C) command is performed. The parameter *n* indicates the number of lines to be skipped at the bottom of each page. The parameter must be greater than zero and less than the defined page length in lines. If the parameter is invalid, the command is ignored.

The example shows a 12-line skip perforation. This will print 54 lines and feed the paper 12 lines for a page length of 66 lines.

```
LPRINT CHR$(27);CHR$(78);CHR$(12);
```

ESC O Cancel Skip-Over Perforation

This command cancels the skip-over perforation function which is activated by the ESC N command.

```
LPRINT CHR$(27);CHR$(79);
```

ESC P Proportional Space Mode

ESC P *n*

Activates and deactivates the proportional space mode.

n=even (0 to 254) deactivates proportional space mode (default)
If the proportional space (PS) printwheel is installed, the option will go to *not ready* and give a change printwheel indicator.

n=odd (1 to 255) activates proportional space mode
If a PS printwheel is not installed, the option will go to *not ready* and give a change printwheel indicator.

The HMI is considered to be the width of the space CHR$(32) character. This width also applies to backspace and columns for the purpose of setting horizontal tab stops.

Note: Printer mode settings (for example, bold, emphasize, double-wide) are not set/reset by proportional space mode.

```
LPRINT CHR$(27);CHR$(80);CHR$(n);
```

ESC R Reset All Tabs

This command causes horizontal tabs to be reset and vertical tabs to be cleared. Horizontal tabs are set every eight positions starting with the ninth column. When vertical tabs are cleared, the VT command functions as an LF command.

```
LPRINT CHR$(27);CHR$(82);
```

ESC S **Begin Superscript/Subscript Mode**

ESC S *n*

Sets the superscript or subscript mode for subsequent text data. Once the mode is activated, it remains active until an ESC T command is encountered or the ESC S command establishes another superscript/subscript mode, where :

n=odd (1 to 255) starts subscript mode.
n=even (0 to 254) starts superscript mode.

This command allows printing subscripts/superscripts as full sized characters 5/96ths of an inch above/below the current line.

```
LPRINT CHR$(27);CHR$(83);CHR$(n);
```

ESC T **End Superscript/Subscript Mode**

This command cancels superscript or subscript mode and returns the print position to the base writing line.

```
LPRINT CHR$(27);CHR$(84);
```

ESC U Set Print Direction

ESC U *n*

Specifies the print direction for all subsequent lines of text. The command is accepted at any time; however, it is executed only on line boundaries. The default printer mode is bidirectional.

n=0 for bidirectional print (default mode)
n=1 for left-to-right print

If an *n* value other than 1 is received, the command sets bidirectional mode.

```
LPRINT CHR$(27);CHR$(85);CHR$(n);
```

ESC W Begin/End Continuous Double-Wide Printing

ESC W *n*

n=odd (1 to 255) starts Double Width Mode
n=even (0 to 254) stops Double Width Mode

Selects double-wide print mode in which all graphics and spaces are printed with double the HMI setting. This will preserve the correct horizontal spacing for applications which use the double-wide print mode. If double-wide print has been activated by the SO command, the receipt of the ESC W automatically cancels the SO command. The mode remains active until it is ended by an ESC W command followed by a parameter value of $n = 0$ (zero or EVEN value) or until the printer option is initialized. This command also resets double-wide printing previously begun by an SO command.

```
LPRINT CHR$(27);CHR$(87);CHR$(n);
```

ESC X **Set Horizontal Margins**

ESC X *m*, *n*

Margins are specified in character positions at the current pitch or HMI. *m* specifies the left margin and *n* specifies the right margin. The command establishes the current print position at the new left margin. The values of *m* and *n* can be set to zero to 255. A value of *m* equals zero uses the current left margin setting. A value of *n* equals zero uses the current right margin setting. The value of *n* must be greater than or equal to *m*. When the printer option is initialized, the left margin is set to 8.0 or 13.2 inches, depending on the default setting for line length. See "Line Length (Page Width)" on page 3-2.

For example, to set the left margin at 10 and the right margin at 90:

```
LPRINT CHR$(27);CHR$(88);CHR$(10);
       CHR$(90);
```

ESC ** **Print All Characters

ESC \ *m*, *n* c1 c2 ... ck

Specifies that the next (256 x *n*) + *m* characters are to be interpreted as printable characters, including those that occur in the code point area normally reserved for commands. The character printed is a function of the active code page. See "Alternate Code Page" on page 3-3 or "Code Page Tables" on page 3-34, and the installed printwheel. No command functions are performed for the duration of this command. If the character is not available on the installed printwheel, a *space* is printed.

```
LPRINT CHR$(27);CHR$(92);CHR$(m);CHR$(n);
       CHR$(c1); ... CHR$(ck);
```

ESC] **Reverse Line Feed**

This command causes the printer to do a reverse line feed equal to the current line spacing. For cut sheet forms, the reverse index move is limited to the top of form setting. This command causes only vertical movement.

```
LPRINT CHR$(27);CHR$(93);
```

ESC ^ **Print Single Character**

ESC ^ *n*

This command causes the code point represented by the parameter *n* to be printed as a character even though its normal interpretation may be as a control. The following example will print the paragraph symbol (¶) if the paragraph symbol is on the printwheel. The paragraph symbol has the decimal value of 20.

```
LPRINT CHR$(27);CHR$(94);CHR$(20);
```

ESC d **Space Forward**

ESC d *n*, *m*

This command spaces the print position forward a specified distance. The distance in inches is equal to *n* plus 256 times *m*, divided by 120, $[(n + 256m)/120]$. This command may be used in place of the SP (space) control to justify text. If the continuous underline mode is active (ESC -), the space generated by this command is automatically underlined. If the specified distance exceeds the right margin, the print position is moved to the right margin. For example, to advance the printing position 35/120 inches:

```
LPRINT CHR$(27);CHR$(100);CHR$(35);
       CHR$(00);
```

ESC e **Space Backward**

ESC e *n*, *m*

This command spaces the print position backward a specified distance. The distance in inches is equal to *n* plus 256 times *m*, divided by 120, [(*n* + 256*m*)/120]. Space generated by this command is not underlined. If the specified distance exceeds the left margin, the print position is returned to the left margin. For example, to backspace 23/120 inches:

```
LPRINT CHR$(27);CHR$(101);CHR$(23);
       CHR$(00);
```

ESC h **Partial Index Down**

Causes the paper to move up 5/96ths of an inch.

```
LPRINT CHR$(27);CHR$(104);
```

ESC i **Partial Index Up**

Causes the paper to move down 5/96ths of an inch.

```
LPRINT CHR$(27);CHR$(105);
```

ESC j **Stop**

This command places the printer option *not ready* and the beeper sounds three times. All data is processed up to the point of the stop command. To return to *ready* mode, press **6**.

```
LPRINT CHR$(27);CHR$(106);
```

ESC [W Set impression Level (SIL)

ESC [W *n*1 *n*2 *m*

This command allows you to choose the impression setting to obtain the best print quality for an application, such as carbons or light or heavy weight paper. *n*1 and *n*2 specify the number of parameters contained in this sequence and *m* specifies the impression level. For this command:

*n*1 = 1
*n*2 = 0
and
m = 1 to 85 Sets impression level to light
m = 86 to 170 Sets impression level to normal
m = 171 to 255 Sets impression level to heavy

When the printer option is turned on, the impression level is set to the same impression level as the typewriter. When the printer option is turned off, the impression level is restored to the original typewriter mode setting.

```
LPRINT CHR$(27);CHR$(91);CHR$(87);CHR$(n1);
       CHR$(n2);CHR$(m);
```

**ESC [** Set Vertical Units (SUNIT)

ESC [\ *n*1 *n*2 *t*1 *t*2

This command specifies the vertical units used by the ESC A sequence, where: *n*1 and *n*2 specify the number of parameters contained in this sequence. For this command:

*n*1 = 2
*n*2 = 0

*t*1 and *t*2 make up a two-value parameter which specifies which of the available vertical unit settings are to be used. The values of *t* are:

*t*2 = 0, *t*1 = 0: current value
*t*2 = 0, *t*1 = 48: 1/48 inch
*t*2 = 0, *t*1 = 72: 1/72 inch (default)
*t*2 = 0, *t*1 = 96: 1/96 inch

Values other than these will cause a setting of 1/72 to be used.

```
LPRINT CHR$(27);CHR$(91);CHR$(92);CHR$(n1);
       CHR$(n2);CHR$(t1);CHR$(t2);
```

Code Page Assignments

Keyboard Name	ID Number	Primary Code Page	Alternate Code Page
ASCII (PC)[2]	103	437	850
Australia	1	437	850
Austria	29	850	437
Belgium	251	850	437
Brazil	61	850	437
Canada (Bilingual)	39	850	437
Canada (English)	1	437	850
Denmark	59	850	437
Finland	53	850	437
France	251	850	437
Germany (PC)[2]	249	850	437
Germany (West)	29	850	437
Greece (Greek)	219	851	437
Greece (Latin)	207	851	437
Hong Kong	119	850	437
Italy	41	850	437
Italy (PC)[2]	247	850	437
Japan (English)	69	850	437
Latin America	25	850	437
Latin Supplemental ISO[1]	99	850	437
Netherlands	43	850	437
New Zealand	1	437	850
Norway	55	850	437
Portugal	63	850	437
South Africa	81	850	437
Spain	70	850	437
Sweden	53	850	437
Switzerland (French)	49	850	437
Switzerland (German)	51	850	437
Turkey	79	853	437
United Kingdom	67	850	437
United Kingdom (PC)[2]	252	850	437
United States	1	437	850

[1] Special application keyboard chart.

[2] Personal computer keyboard charts.

Printable Characters

Characters available for printing are limited to those characters on each printwheel. In order to print some characters, you may need to install a different printwheel. To identify the characters available, see the keyboard charts in the Typewriter Operator's Guide. For information on available printwheels, contact your IBM Authorized Dealer. In the U.S., you may also call IBM Direct at 1-800-IBM-2468. In Canada, call IBM Direct at 1-800-465-1234. Some additional characters, listed on the code pages, are printed by combining characters on a printwheel with accent marks on the same printwheel. A space (SP) is substituted, if the character is not available on the printwheel. You may be able to print the character by selecting the alternate code page. See "Default Settings" on page 3-1 and "Code Page Tables" on page 3-34.

Code Pages

Explanation of Code Pages

A code page is a summary of graphic symbols associated with each of the 256 single-byte printer code points which can be sent from the personal computer. Supporting different code pages allows the printer option to support different language requirements. The printer option supports code pages 437, 850, 851, and 853. However, typewriters that do not support an alternate language support only code page 437.

Note: Printable characters are limited to those on the installed printwheel.

Using Code Page Tables

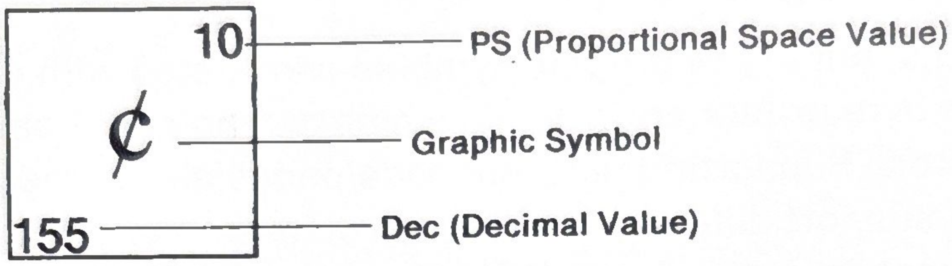
The supported code page listings start on 3-34.

Each code page is contained on two pages and is shown in its entirety for reference. Shaded boxes indicate graphic characters not available on existing printwheels. Hexadecimal numbers 00 to 7F are on the first page and 80 to FF are on the second page.

The hexadecimal value (Hex) for single-byte printer control codes are hexadecimal representations of the binary data that is sent to the printer.

Hexadecimal numbers are located in the row across the top of each table and in the column down the left side of each table. To locate a number, read the top row for the first digit and the left column for the second digit.

Each box, corresponding to a hexadecimal number, contains the following information: the proportional space value, the graphic symbol and the decimal value. Hexadecimal number 9B for code page 437 is given below as an example.


10
¢
155
PS (Proportional Space Value)
Graphic Symbol
Dec (Decimal Value)

PS

In proportionally spaced printwheels, the width of each character varies. The PS shows the proportional space escape width for each character in units of 1/120th of an inch.

Dec

The decimal value (Dec) for single-byte printer control codes are used by many text editors and software languages (such as BASIC) to represent codes to be sent to the printer.

Graphic Symbol

The graphic symbol shows the character or graphic symbol associated with each of the 256 single-byte printer code points for the specific code page.

Notes:

1. SP on the code pages indicates a space will be printed (carrier moves one space).
2. If a graphic character is not printable with the installed printwheel, a space is printed. When the space is printed instead of a graphic character, the proportional space value used is equal to the proportional space value of the SP.

Code Page Tables

Code Page 437

	0-	1-	2-	3-	4-	5-	6-	7-
-0	10 0	10 ► 16	10 SP 32	10 0 48	10 @ 64	12 P 80	10 ` 96	12 p 112
-1	10 ☺ 1	10 ◄ 17	10 ! 33	10 1 49	14 A 65	14 Q 81	10 a 97	12 q 113
-2	10 ☻ 2	10 ↕ 18	10 " 34	10 2 50	14 B 66	14 R 82	12 b 98	10 r 114
-3	10 ♥ 3	10 ‼ 19	10 # 35	10 3 51	14 C 67	12 S 83	10 c 99	10 s 115
-4	10 ♦ 4	10 ¶ 20	10 $ 36	10 4 52	14 D 68	14 T 84	12 d 100	8 t 116
-5	10 ♣ 5	10 § 21	10 % 37	10 5 53	12 E 69	14 U 85	10 e 101	12 u 117
-6	10 ♠ 6	10 ▬ 22	12 & 38	10 6 54	12 F 70	14 V 86	8 f 102	12 v 118
-7	10 • 7	10 ↨ 23	6 ' 39	10 7 55	14 G 71	14 W 87	12 g 103	14 w 119
-8	10 ◘ 8	10 ↑ 24	10 (40	10 8 56	14 H 72	14 X 88	12 h 104	12 x 120
-9	10 ○ 9	10 ↓ 25	10) 41	10 9 57	8 I 73	14 Y 89	6 i 105	12 y 121
-A	10 ◙ 10	10 → 26	10 * 42	10 : 58	10 J 74	12 Z 90	6 j 106	10 z 122
-B	10 ♂ 11	10 ← 27	10 + 43	10 ; 59	14 K 75	10 [91	12 k 107	10 { 123
-C	10 ♀ 12	10 ∟ 28	10 , 44	10 < 60	12 L 76	10 \ 92	6 l 108	10 | 124
-D	10 ♪ 13	10 ↔ 29	10 - 45	10 = 61	14 M 77	10] 93	14 m 109	10 } 125
-E	10 ♫ 14	10 ▲ 30	10 . 46	10 > 62	14 N 78	10 ^ 94	12 n 110	10 ~ 126
-F	10 ☼ 15	10 ▼ 31	10 / 47	10 ? 63	14 O 79	10 _ 95	10 o 111	10 ⌂ 127

Code Page 437 (continued)

	8-	9-	A-	B-	C-	D-	E-	F-
-0	14 Ç 128	12 É 144	10 á 160	10 ░ 176	10 └ 192	10 ╨ 208	10 α 224	10 ≡ 240
-1	12 ü 129	14 æ 145	10 í 161	10 ▒ 177	10 ┴ 193	10 ╤ 209	10 β 225	10 ± 241
-2	10 é 130	14 Æ 146	10 ó 162	10 ▓ 178	10 ┬ 194	10 ╥ 210	10 Γ 226	10 ≥ 242
-3	10 â 131	10 ô 147	12 ú 163	10 │ 179	10 ├ 195	10 ╙ 211	12 π 227	10 ≤ 243
-4	10 ä 132	10 ö 148	12 ñ 164	10 ┤ 180	10 ─ 196	10 ╘ 212	14 Σ 228	10 ⌠ 244
-5	10 à 133	10 ò 149	14 Ñ 165	10 ╡ 181	10 ┼ 197	10 ╒ 213	12 σ 229	10 ⌡ 245
-6	10 å 134	12 û 150	10 ª 166	10 ╢ 182	10 ╞ 198	10 ╓ 214	12 µ 230	10 ÷ 246
-7	10 ç 135	12 ù 151	10 º 167	10 ╖ 183	10 ╟ 199	10 ╫ 215	10 τ 231	10 ≈ 247
-8	10 ê 136	12 ÿ 152	10 ¿ 168	10 ╕ 184	10 ╚ 200	10 ╪ 216	10 Φ 232	10 ° 248
-9	10 ë 137	14 Ö 153	10 ⌐ 169	10 ╣ 185	10 ╔ 201	10 ┘ 217	14 Θ 233	10 ∙ 249
-A	10 è 138	14 Ü 154	10 ¬ 170	10 ║ 186	10 ╩ 202	10 ┌ 218	14 Ω 234	10 · 250
-B	10 ï 139	10 ¢ 155	10 ½ 171	10 ╗ 187	10 ╦ 203	10 █ 219	10 δ 235	10 √ 251
-C	10 î 140	10 £ 156	10 ¼ 172	10 ╝ 188	10 ╠ 204	10 ▄ 220	10 ∞ 236	10 ⁿ 252
-D	6 ì 141	10 ¥ 157	10 ¡ 173	10 ╜ 189	10 ═ 205	10 ▌ 221	10 ø 237	10 ² 253
-E	14 Ä 142	10 Pts 158	14 « 174	10 ╛ 190	10 ╬ 206	10 ▐ 222	10 ε 238	10 ■ 254
-F	14 Å 143	10 ƒ 159	14 » 175	10 ┐ 191	10 ╧ 207	10 ▀ 223	10 ∩ 239	10 SP 255

Code Page 850

	0-	1-	2-	3-	4-	5-	6-	7-
-0	10 0	10 ► 16	10 SP 32	10 0 48	10 @ 64	12 P 80	10 ` 96	12 p 112
-1	10 ☺ 1	10 ◄ 17	10 ! 33	10 1 49	14 A 65	14 Q 81	10 a 97	12 q 113
-2	10 ☻ 2	10 ↕ 18	10 " 34	10 2 50	14 B 66	14 R 82	12 b 98	10 r 114
-3	10 ♥ 3	10 ‼ 19	10 # 35	10 3 51	14 C 67	12 S 83	10 c 99	10 s 115
-4	10 ♦ 4	10 ¶ 20	10 $ 36	10 4 52	14 D 68	14 T 84	12 d 100	8 t 116
-5	10 ♣ 5	10 § 21	10 % 37	10 5 53	12 E 69	14 U 85	10 e 101	12 u 117
-6	10 ♠ 6	10 ▬ 22	12 & 38	10 6 54	12 F 70	14 V 86	8 f 102	12 v 118
-7	10 • 7	10 ↨ 23	6 ' 39	10 7 55	14 G 71	14 W 87	12 g 103	14 w 119
-8	10 ◘ 8	10 ↑ 24	10 (40	10 8 56	14 H 72	14 X 88	12 h 104	12 x 120
-9	10 ○ 9	10 ↓ 25	10) 41	10 9 57	8 I 73	14 Y 89	6 i 105	12 y 121
-A	10 ◙ 10	10 → 26	10 * 42	10 : 58	10 J 74	12 Z 90	6 j 106	10 z 122
-B	10 ♂ 11	10 ← 27	10 + 43	10 ; 59	14 K 75	10 [91	12 k 107	10 { 123
-C	10 ♀ 12	10 ∟ 28	10 , 44	10 < 60	12 L 76	10 \ 92	6 l 108	10 | 124
-D	10 ♪ 13	10 ↔ 29	10 - 45	10 = 61	14 M 77	10] 93	14 m 109	10 } 125
-E	10 ♫ 14	10 ▲ 30	10 . 46	10 > 62	14 N 78	10 ^ 94	12 n 110	10 ~ 126
-F	10 ☼ 15	10 ▼ 31	10 / 47	10 ? 63	14 O 79	10 _ 95	10 o 111	10 ⌂ 127

Code Page 850 (continued)

	8-	9-	A-	B-	C-	D-	E-	F-
-0	14 Ç 128	12 É 144	10 á 160	10 ░ 176	10 └ 192	10 ð 208	10 Ó 224	10 − 240
-1	12 ü 129	14 æ 145	6 í 161	10 ▒ 177	10 ┴ 193	10 Ð 209	12 β 225	10 ± 241
-2	10 é 130	14 Æ 146	10 ó 162	10 ▓ 178	10 ┬ 194	10 Ê 210	12 Ô 226	10 ‗ 242
-3	10 â 131	10 ô 147	12 ú 163	10 │ 179	10 ├ 195	10 Ë 211	12 Ò 227	10 ¾ 243
-4	10 ä 132	10 ö 148	12 ñ 164	10 ┤ 180	10 ─ 196	10 È 212	14 õ 228	10 ¶ 244
-5	10 à 133	10 ò 149	14 Ñ 165	10 Á 181	10 ┼ 197	6 ı 213	12 Õ 229	10 § 245
-6	10 å 134	12 û 150	10 ª 166	10 Â 182	10 ã 198	10 Í 214	12 µ 230	10 ÷ 246
-7	10 ç 135	12 ù 151	10 º 167	10 À 183	10 Ã 199	10 Î 215	10 þ 231	10 ¸ 247
-8	10 ê 136	12 ÿ 152	10 ¿ 168	10 © 184	10 ╚ 200	10 Ï 216	14 Þ 232	10 ° 248
-9	10 ë 137	14 Ö 153	14 ® 169	10 ╣ 185	10 ╔ 201	10 ┘ 217	14 Ú 233	10 ¨ 249
-A	10 è 138	14 Ü 154	10 ¬ 170	10 ║ 186	10 ╩ 202	10 ┌ 218	14 Û 234	10 • 250
-B	6 ï 139	12 ø 155	10 ½ 171	10 ╗ 187	10 ╦ 203	10 █ 219	10 Ù 235	10 ¹ 251
-C	6 î 140	10 £ 156	10 ¼ 172	10 ╝ 188	10 ╠ 204	10 ▄ 220	10 ý 236	10 ³ 252
-D	6 ì 141	10 Ø 157	10 ¡ 173	10 ¢ 189	10 ═ 205	10 ¦ 221	14 Ý 237	10 ² 253
-E	14 Ä 142	10 × 158	14 « 174	10 ¥ 190	10 ╬ 206	10 Ì 222	10 ¯ 238	10 ■ 254
-F	14 Å 143	10 ƒ 159	14 » 175	10 ┐ 191	10 ¤ 207	10 ▀ 223	10 ´ 239	10 SP 255

Code Page 851

	0-	1-	2-	3-	4-	5-	6-	7-
-0	10 0	► 10 16	SP 10 32	0 10 48	@ 10 64	P 12 80	` 10 96	p 12 112
-1	☺ 10 1	◄ 10 17	! 10 33	1 10 49	A 14 65	Q 14 81	a 10 97	q 12 113
-2	☻ 10 2	↕ 10 18	" 10 34	2 10 50	B 14 66	R 14 82	b 12 98	r 10 114
-3	♥ 10 3	‼ 10 19	# 10 35	3 10 51	C 14 67	S 12 83	c 10 99	s 10 115
-4	♦ 10 4	¶ 10 20	$ 10 36	4 10 52	D 14 68	T 14 84	d 12 100	t 8 116
-5	♣ 10 5	§ 10 21	% 10 37	5 10 53	E 12 69	U 14 85	e 10 101	u 12 117
-6	♠ 10 6	▬ 10 22	& 12 38	6 10 54	F 12 70	V 14 86	f 8 102	v 12 118
-7	• 10 7	↨ 10 23	' 6 39	7 10 55	G 14 71	W 14 87	g 12 103	w 14 119
-8	◘ 10 8	↑ 10 24	(10 40	8 10 56	H 14 72	X 14 88	h 12 104	x 12 120
-9	○ 10 9	↓ 10 25	) 10 41	9 10 57	I 8 73	Y 14 89	i 6 105	y 12 121
-A	◙ 10 10	→ 10 26	* 10 42	: 10 58	J 10 74	Z 12 90	j 6 106	z 10 122
-B	♂ 10 11	← 10 27	+ 10 43	; 10 59	K 14 75	[10 91	k 12 107	{ 10 123
-C	♀ 10 12	∟ 10 28	, 10 44	< 10 60	L 12 76	\ 10 92	l 6 108	| 10 124
-D	♪ 10 13	↔ 10 29	- 10 45	= 10 61	M 14 77	] 10 93	m 14 109	} 10 125
-E	♫ 10 14	▲ 10 30	. 10 46	> 10 62	N 14 78	^ 10 94	n 12 110	~ 10 126
-F	☼ 10 15	▼ 10 31	/ 10 47	? 10 63	O 14 79	_ 10 95	o 10 111	⌂ 10 127

Code Page 851 (continued)

	8 -	9 -	A -	B -	C -	D -	E -	F -
-0	14 Ç 128	12 Ί 144	10 ϊ 160	10 ░ 176	10 └ 192	14 Τ 208	10 ζ 224	10 – 240
-1	12 ü 129	14 145	6 ΐ 161	10 ▒ 177	10 ┴ 193	10 Υ 209	10 η 225	10 ± 241
-2	10 é 130	14 Ό 146	10 ό 162	10 ▓ 178	10 ┬ 194	14 Φ 210	12 ϑ 226	10 υ 242
-3	10 â 131	10 ô 147	12 ύ 163	10 │ 179	10 ├ 195	14 Χ 211	8 ι 227	14 φ 243
-4	10 ä 132	10 ö 148	14 Α 164	10 ┤ 180	10 ─ 196	14 Ψ 212	10 κ 228	14 χ 244
-5	10 à 133	10 Ύ 149	14 Β 165	14 Κ 181	10 ┼ 197	14 Ω 213	12 λ 229	10 § 245
-6	10 Ά 134	12 û 150	12 Γ 166	14 Λ 182	14 Π 198	10 α 214	12 μ 230	14 ψ 246
-7	10 ç 135	12 ù 151	14 Δ 167	14 Μ 183	12 Ρ 199	10 β 215	12 ν 231	10 . 247
-8	10 ê 136	12 Ώ 152	12 Ε 168	14 Ν 184	10 ╚ 200	12 γ 216	12 ξ 232	10 ° 248
-9	10 ë 137	14 Ö 153	12 Ζ 169	10 ╣ 185	10 ╔ 201	10 ┘ 217	10 ο 233	10 ¨ 249
-A	10 è 138	14 Ü 154	14 Η 170	10 ║ 186	10 ╩ 202	10 ┌ 218	12 π 234	12 ω 250
-B	6 ï 139	10 ά 155	10 ½ 171	10 ╗ 187	10 ╦ 203	10 █ 219	12 ρ 235	10 ϋ 251
-C	6 î 140	10 £ 156	14 Θ 172	10 ╝ 188	10 ╠ 204	10 ▄ 220	12 σ 236	10 ΰ 252
-D	6 Έ 141	10 έ 157	8 Ι 173	12 Ξ 189	10 ═ 205	10 δ 221	14 ς 237	12 ώ 253
-E	14 Ä 142	10 ή 158	14 « 174	14 Ο 190	10 ╬ 206	10 ε 222	10 τ 238	10 ■ 254
-F	14 Ή 143	10 ί 159	14 » 175	10 ┐ 191	14 Σ 207	10 ▀ 223	10 ΄ 239	10 SP 255

Code Page 853

	0 -	1 -	2 -	3 -	4 -	5 -	6 -	7 -
-0	10 0	10 ► 16	10 SP 32	10 0 48	10 @ 64	12 P 80	10 ` 96	12 p 112
-1	10 ☺ 1	10 ◄ 17	10 ! 33	10 1 49	14 A 65	14 Q 81	10 a 97	12 q 113
-2	10 ☻ 2	10 ↕ 18	10 " 34	10 2 50	14 B 66	14 R 82	12 b 98	10 r 114
-3	10 ♥ 3	10 ‼ 19	10 # 35	10 3 51	14 C 67	12 S 83	10 c 99	10 s 115
-4	10 ♦ 4	10 ¶ 20	10 $ 36	10 4 52	14 D 68	14 T 84	12 d 100	8 t 116
-5	10 ♣ 5	10 § 21	10 % 37	10 5 53	12 E 69	14 U 85	10 e 101	12 u 117
-6	10 ♠ 6	10 ▬ 22	12 & 38	10 6 54	12 F 70	14 V 86	8 f 102	12 v 118
-7	10 • 7	10 ↨ 23	6 ' 39	10 7 55	14 G 71	14 W 87	12 g 103	14 w 119
-8	10 ◘ 8	10 ↑ 24	10 (40	10 8 56	14 H 72	14 X 88	12 h 104	12 x 120
-9	10 ○ 9	10 ↓ 25	10) 41	10 9 57	8 I 73	14 Y 89	6 i 105	12 y 121
-A	10 ◙ 10	10 → 26	10 * 42	10 : 58	10 J 74	12 Z 90	6 j 106	10 z 122
-B	10 ♂ 11	10 ← 27	10 + 43	10 ; 59	14 K 75	10 [91	12 k 107	10 { 123
-C	10 ♀ 12	10 ∟ 28	10 , 44	10 < 60	12 L 76	10 \ 92	6 l 108	10 | 124
-D	10 ♪ 13	10 ↔ 29	10 - 45	10 = 61	14 M 77	10] 93	14 m 109	10 } 125
-E	10 ♫ 14	10 ▲ 30	10 . 46	10 > 62	14 N 78	10 ^ 94	12 n 110	10 ~ 126
-F	10 ☼ 15	10 ▼ 31	10 / 47	10 ? 63	14 O 79	10 _ 95	10 o 111	10 ⌂ 127

Code Page 853 (continued)

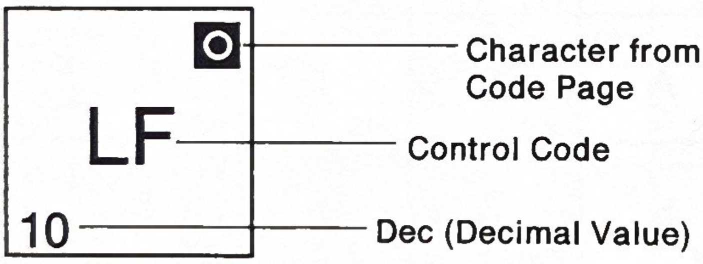
	8 -	9 -	A -	B -	C -	D -	E -	F -
-0	14 Ç 128	12 É 144	10 á 160	10 ░ 176	10 └ 192	10 208	10 Ó 224	10 − 240
-1	12 ü 129	14 ċ 145	6 í 161	10 ▒ 177	10 ┴ 193	10 209	12 β 225	10 241
-2	10 é 130	14 Ċ 146	10 ó 162	10 ▓ 178	10 ┬ 194	10 Ê 210	12 Ô 226	10 ℓ 242
-3	10 â 131	10 ô 147	12 ú 163	10 │ 179	10 ├ 195	10 Ë 211	12 Ò 227	10 ʼn 243
-4	10 ä 132	10 ö 148	12 ñ 164	10 ┤ 180	10 ─ 196	10 È 212	14 Ġ 228	10 ˘ 244
-5	10 à 133	10 ò 149	14 Ñ 165	10 Á 181	10 ┼ 197	6 ı 213	12 ġ 229	10 § 245
-6	10 ĉ 134	12 û 150	14 Ğ 166	10 Â 182	10 Ŝ 198	10 Í 214	12 µ 230	10 ÷ 246
-7	10 ç 135	12 ù 151	12 ğ 167	10 À 183	10 ŝ 199	10 Î 215	10 Ħ 231	10 ˙ 247
-8	10 ê 136	8 İ 152	10 Ĥ 168	12 Ş 184	10 ╚ 200	10 Ï 216	14 ħ 232	10 ° 248
-9	10 ë 137	14 Ö 153	10 ĥ 169	10 ╣ 185	10 ╔ 201	10 ┘ 217	14 Ú 233	10 ¨ 249
-A	10 è 138	14 Ü 154	10 170	10 ║ 186	10 ╩ 202	10 ┌ 218	14 Û 234	10 • 250
-B	6 ï 139	10 ĝ 155	10 ½ 171	10 ╗ 187	10 ╦ 203	10 █ 219	10 Ù 235	10 251
-C	6 î 140	10 £ 156	10 ĵ 172	10 ╝ 188	10 ╠ 204	10 ▄ 220	10 Ŭ 236	10 ³ 252
-D	6 ì 141	10 Ĝ 157	10 ş 173	10 Ż 189	10 ═ 205	10 221	14 ŭ 237	10 ² 253
-E	14 Ä 142	14 × 158	14 « 174	10 ż 190	10 ╬ 206	10 Ì 222	10 238	10 ■ 254
-F	14 Ĉ 143	10 Ĵ 159	14 » 175	10 ┐ 191	10 ¤ 207	10 ▀ 223	10 ´ 239	10 SP 255

Character Sets 1 and 2

The printer option's interpretation of code points is based on whether character set 1 or character set 2 is selected. Character set 1 has control codes located between hex 00 and hex 1F, and between hex 80 and hex 9F. Character set 2 only has control codes located between hex 00 and hex 1F.

The code page columns that differ between character set 1 and character set 2 are shown in the tables on the following two pages. The hexadecimal numbers are read in the same manner as the code pages.

The character sets contain a mixture of printer control codes and characters as defined by the IBM Personal Computer character sets 1 and 2. The boxes show how the printer option will interpret single-byte codes, depending on which character set you have selected. For example, hex 0A:



Note: The graphics shown are from code page 437. The actual graphic depends on which code page is active.

Character Set 1

	0 -	1 -
-0	NUL 0	► 16
-1	☺ 1	◄ DC1 17
-2	☻ 2	↕ DC2 18
-3	♥ 3	!! 19
-4	♦ 4	¶ DC4 20
-5	♣ 5	§ 21
-6	♠ 6	▬ 22
-7	• BEL 7	↨ 23
-8	◘ BS 8	↑ 24
-9	○ HT 9	↓ 25
-A	◙ LF 10	→ 26
-B	♂ VT 11	← ESC 27
-C	♀ FF 12	∟ 28
-D	♪ CR 13	↔ 29
-E	♫ SO 14	▲ 30
-F	☼ SI 15	▼ 31

	8 -	9 -
- 0	Ç 128	É 144
- 1	ü 129	æ DC1 145
- 2	é 130	Æ DC2 146
- 3	â 131	ô 147
- 4	ä 132	ö DC4 148
- 5	à 133	ò 149
- 6	å 134	û 150
- 7	ç BEL 135	ù 151
- 8	ê BS 136	ÿ 152
- 9	ë HT 137	Ö 153
- A	è LF 138	Ü 154
- B	ï VT 139	¢ ESC 155
- C	î FF 140	£ 156
- D	ì CR 141	¥ 157
- E	Ä SO 142	₧ 158
- F	Å SI 143	ƒ 159

Character Set 2

	0 -	1 -	8 -	9 -
- 0	NUL 0	► 16	Ç Ç 128	É É 144
- 1	☺ 1	◄ DC1 17	ü ü 129	æ æ 145
- 2	☻ 2	↕ DC2 18	é é 130	Æ Æ 146
- 3	♥ ♥ 3	‼ 19	â â 131	ô ô 147
- 4	♦ ♦ 4	¶ DC4 20	ä ä 132	ö ö 148
- 5	♣ ♣ 5	§ § 21	à à 133	ò ò 149
- 6	♠ ♠ 6	▬ 22	å å 134	û û 150
- 7	• BEL 7	↨ 23	ç ç 135	ù ù 151
- 8	◘ BS 8	↑ 24	ê ê 136	ÿ ÿ 152
- 9	○ HT 9	↓ 25	ë ë 137	Ö Ö 153
- A	◙ LF 10	→ 26	è è 138	Ü Ü 154
- B	♂ VT 11	← ESC 27	ï ï 139	¢ ¢ 155
- C	♀ FF 12	∟ 28	î î 140	£ £ 156
- D	♪ CR 13	↔ 29	ì ì 141	¥ ¥ 157
- E	♫ SO 14	▲ 30	Ä Ä 142	Pts Pts 158
- F	☼ SI 15	▼ 31	Å Å 143	ƒ ƒ 159

Parallel Interface Description

The printer option uses a parallel interface. This interface consists of an 8-bit parallel data bus with the following general characteristics:

- Synchronization: By externally supplied STROBE* pulses
- Handshaking: ACKNLG* or BUSY signals
- Logic level: Input data and all interface command signals are compatible with standard TTL logic levels.
- Connector: The connector at the rear of the printer is designed to attach to a 36-pin microribbon plug, such as the Amphenol 57-30360.

The connector pin assignments and descriptions are given on the following three pages.

Notes:

1. *Direction* refers to the direction of information flow as viewed from the printer option.
2. *Return* refers to *Twisted Pair Return* and is to be connected to signal ground level.

   Be sure to use a twisted-pair cable for each signal in the interface wiring and always complete the connection on the return side. To prevent noise effectively, these cables should be shielded and connected to the chassis of the system unit. The length should not exceed 1.8 m (6 ft). IBM cable P/N 1525612 meets these requirements.
3. All interface conditions are based on TTL levels. Both the rise and fall times of each signal must be less than 0.2µs.
4. Data transfer must not be carried out by ignoring the ACKNLG* or BUSY signal. (Data transfer to this printer option can be carried out only after confirming the ACKNLG* signal or when the level of the BUSY signal is *LOW*.)

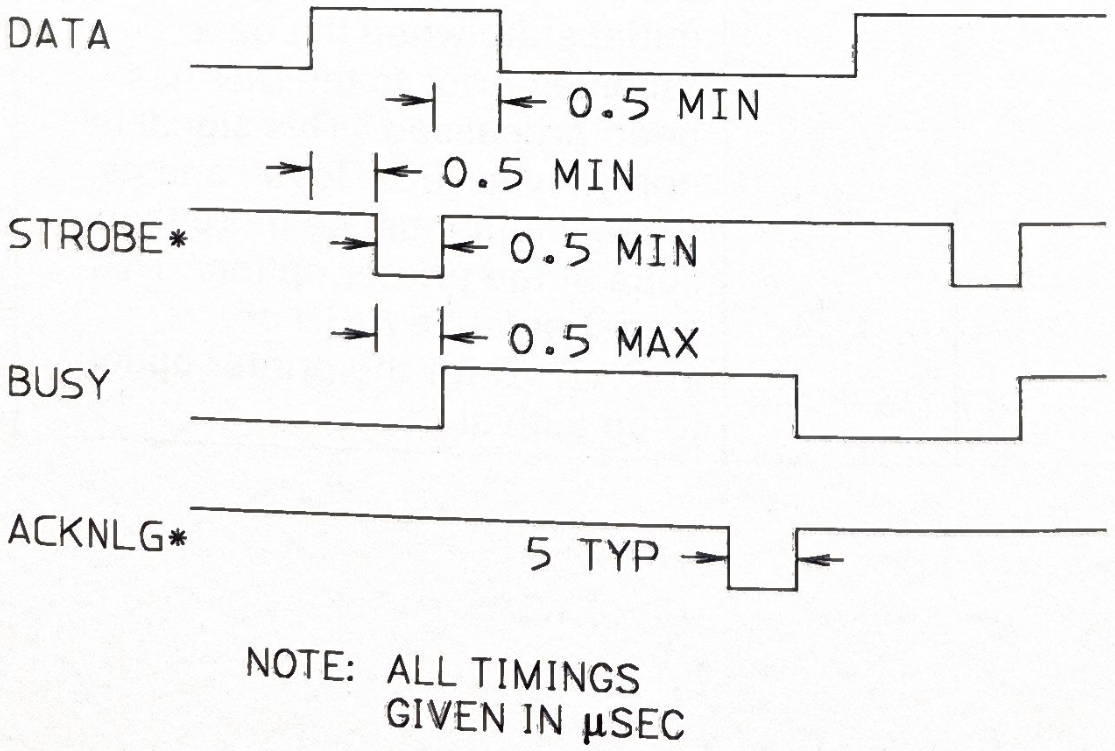
Connector Pin Assignments and Descriptions

Signal Pin #	Signal	Direction	Description
1	STROBE*	In	STROBE* pulse to read data in. Pulse width must be more than 0.5µs and less than 100.0µs. The signal level is normally *HIGH*; read-in of data is performed at the *FALLING EDGE* of this signal.
2-9	DATA0-7	In	The DATA0 through DATA7 signals represent data bits 0 to 7 respectively. Each signal is at *HIGH* level when data is logical *1* and *LOW* when logical *0*. The data must be valid at least 0.5µs before the STROBE* pulse goes *LOW* and must remain valid at least 0.5µs after STROBE* returns *HIGH*.
10	ACKNLG*	Out	Approx. 5µs pulse. *LOW* indicates that the data has been received and that the printer option is ready to receive more data.
11	BUSY	Out	A *HIGH* signal indicates that the printer option cannot receive data. The signal is at a HIGH level in the following cases: • During data entry • When the buffer is full • In the *not ready* mode • During a printer error A *LOW* indicates not busy and data can be sent again by the host computer. (This signal is used primarily by a host polling the line.)

Signal Pin #	Signal	Direction	Description
12	PE	Out	A *HIGH* signal indicates that an out-of-paper condition exists.
13	SLCT	Out	This signal indicates that the printer option is in the *ready* mode. This signal is normally active and it becomes not active when the printer is in the *not ready* mode.
14	AUTO FEED XT*	In	Not used.
15	NC		Not used.
16	GND		Logic ground level.
17	CHASSIS GND		Frame and cable shield ground.
18	NC		Not used.
19-30	GND		Twisted pair ground returns for signals 1 through 12 respectively. (Same as logic ground.)
31	INIT*	In	When this signal becomes *LOW*, the printer option is reset to its initial state when the data received prior to the INIT has been processed. This signal is normally at *HIGH* level, and its pulse width must be more than 50µs at the printer option. This signal must be *HIGH* or *FLOATING* for the printer option to be activated.

Signal Pin #	Signal	Direction	Description
32	ERROR*	Out	Indicates a printer option error condition. The level of this signal becomes low when the printer option is in: • End-of-Ribbon condition • Out-of-Paper condition • *Not ready* mode • Error condition This signal is set 5 seconds after Busy is set as a result of one of the above conditions.
33	GND		Same ground as pins 19 to 30.
34	NC		Not used.
35	VHIGH	Out	Pulled up to +5V through a 10.0K ohm resistance.
36	SLCTIN*	In	Not used.

Data Transfer Sequence/Parallel Interface Timing Diagram


DATA
0.5 MIN
0.5 MIN
STROBE*
0.5 MIN
0.5 MAX
BUSY
ACKNLG*
5 TYP
NOTE: ALL TIMINGS
GIVEN IN μSEC

Problem Determination

This chapter describes problems you may have while using the printer option. If you are having a problem with the option and you do not find that problem described in this chapter, contact your IBM Authorized Dealer.

Problems on typewriters *without* displays are indicated with beeps and lights on the indicator panel. Problems on typewriters *with* displays are indicated with beeps and messages on the display.

Problem Checklist

Turn the typewriter off and do the following checks:

1. Make sure the typewriter power cord is plugged into the back of the typewriter.
2. Make sure the typewriter power cord is completely plugged into a wall outlet.
3. Make sure any other equipment plugged into the same wall outlet operates.
4. Make sure the wall outlet does not turn off with the room lights or other switches.
5. Make sure your printer cable is correctly connected from your computer to your printer option.

Printer Option Cannot Be Turned On

If the printer option cannot be turned on, the problem may be that another function is active; for example, Reprint, Play or Store. Turn off that function, and then turn on the printer option. If the option still cannot be turned on, turn the typewriter off, then on again. If the problem still exists, contact your IBM Authorized Dealer.

Paper Movement Keys Cannot Be Used

Make sure the printer option is on and in the *not ready* mode. Try the paper movement keys again. If they still do not work, turn the typewriter off and then back on. Put the printer in *not ready* mode and try the keys again. If they still do not work and you have a paper feed option installed, see the Operator's Guide for the option. If there is no paper feed option installed, contact your IBM Authorized Dealer.

Default Settings Cannot Be Changed

The printer option must be on and in the *not ready* mode. Make sure you are holding down both **Code** and **Shift** while you press and release the third key to make the selection. See "Default Settings" on page 3-1.

Typewriter Beeps Three Times, Ready Indicator Goes Off

A stop command has been received by the printer option. To return to *ready* mode, press **6**.

Typewriter Beeps Three Times, Paper Out Indicator Comes On

Try one of the following:

- Single sheet operation — Load a single sheet of paper and then press the **6** key to resume printing.
- Pinwheel form feeder option installed — Insert the forms and press **6** to resume printing.

Note: Some types of paper may cause a paper-out indicator to come on. The ignore end of form command (ESC 8) can be sent to override the error indicator.

Typewriter Beeps Three Times and Change Wheel Indicator Comes On

The printer option received a change printwheel command from the computer, (for example, ESC I, or ESC P) or the printwheel is incorrectly installed or missing.

1. Check to see that the printwheel is correctly installed.
2. Press **6** to put the printer option in *ready* mode.
   - Remember, the printer option margins and tabs may change if the new printwheel is a different pitch than the original printwheel.

Typewriter Beeps Three Times, Ready/Ribbon Out Indicator Blinks

An end-of-ribbon condition has been detected. You can finish printing the job or cancel the job.

To finish printing the job:

1. Replace the ribbon cartridge. See the Operator's Guide for your typewriter.
2. Press **6** to put the printer option in *ready* mode. The printing will resume where it stopped.

To cancel the job, press and hold **Code** while you press **5**.

Wrong or Unusual Characters Printing

1. Check to see that the printwheel you are using corresponds to the selected keyboard identification number (Primary or Alternate). It may be necessary to turn the printer option off. Press and hold down **Code** while you press **5**. Then press and hold **Code** while you press **L**, to change the keyboard ID number to correspond to the installed printwheel. If your typewriter does not support alternate languages, make sure the ASCII 103 printwheel is installed. See your Typewriter Operator's Guide for more information.
2. Check to see that the correct character set is selected. See "Character Set" on page 3-3.
3. Check to see that the appropriate code page has been selected. See "Alternate Code Page" on page 3-3.
4. If the problem occurs again, contact your IBM Authorized Dealer.

Missing Characters

All the characters available from your personal computer may not be available on the printwheels for your typewriter. If you are trying to print a character and it is not on the printwheel, a space will appear in the text. See "Printable Characters" on page 3-30.

Printing Stops in Middle of Job

If the printer has been in the *not ready* mode for more than a few moments, the computer *time out* limit may have been exceeded. The amount of time it takes to time out varies for different computers and software packages. If the computer does time out (does not resume sending data to the printer after the *ready* indicator comes back on), you must continue the job or restart the job from the computer.

Computer Application Does Not Run Properly

Your printer option is also controlled by program commands from your computer. There may be commands in your program that are causing the problem. Try running a different program that you have run successfully in the past. If the problem still exists, your option requires service. Contact your IBM Authorized Dealer.

Extra Line Feeds or No Line Feeds after Each Carrier Return

This may be caused by the software program. You may be able to correct this condition by changing the auto line feed default. (Refer to "Default Settings" on page 3-1.) The ESC 5 (Auto Line Feed) command may be set to correct your problem.

Note: If you are still having problems after completing this chapter, see the problem determination chapter in the Operator's Guide for your typewriter and computer.

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